

1. Contact Information (Not for Publication)

Name and Address of Submitter

This should be the name of the organisation accorded “interested person” status

Name	Researched Medicines Industry Association of New Zealand Incorporated (RMI)
Postal Address	P O Box 10 447
Courier Address	Level 8, Castrol House, 36 Customhouse Quay, Wellington
Phone	04 499 4277
Fax	04 499 4276
Email	taschoff@rmianz.co.nz

Contact Person for the Submission (if different from the name of the submitter)

This person should have sufficient knowledge of the submission to be able and available to respond to queries from the Commission

This may be the name of Counsel representing the “interested person”

Name	Terrence Aschoff
Position	General Manager
Postal Address	P O Box 10 447
Courier Address	Level 8, Castrol House, 36 Customhouse Quay, Wellington
Phone	04 499 4277
Fax	04 499 4276
Email	taschoff@rmianz.co.nz

2. Confidential Information (Not for Publication)

Confidential Information

Please indicate whether or not your submission contains any confidential information

No confidential information is contained

Please provide an explanation for any sections of the submission that you wish to remain confidential to the Commission

These sections should be removed from the body of the submission and provided as a separate document marked CONFIDENTIAL

Confidential information should follow the same format as the submission

Clear reference to the existence of confidential information should be included in the body of the submission

3. Submission Description (Not for Publication)

Submission Description

Please provide a *descriptive title* for the submission of no more than 255 characters (including spaces)

The statement will be used as a long title in the Commission’s information management system

Response

Researched Medicines Industry Association of New Zealand Incorporated, on Behalf of the New Zealand Prescription Medicines Industry, responding to the Royal Commission on Genetic Modification.

(For Publication)

4. Name of Organisation/Person accorded “Interested Person” Status

Researched Medicines Industry Association (RMI) - representing in New Zealand the 23 member companies engaged in the research, development, manufacture and marketing of prescription medicines.

5. Submission Executive Summary

Executive Summary

Provide an overarching summary of your submission and recommendations made [in respect of items (1) and (2) of the Warrant]. The Executive Summary should be no more than 3 pages in length

Please note that individual section summaries will be required and therefore the Executive Summary should focus on summarising the issues addressed in the submission and provide cross references to the sections in which the issues are covered rather than summarising the substantive content

1. It is the view of the Researched Medicines Industry Association of New Zealand Incorporated (RMI) that the most appropriate strategic option for New Zealand is to adopt and embrace biotechnological developments in light of the benefits and opportunities for health and welfare currently that they bring and will bring in the future. Genetic modification technology must be allowed to occur and develop, but within an appropriate benefit-risk regulatory framework that enables flexibility for different application types, and in which suitable controls are applied. Similarly, the availability of products that arise through biotechnology - providing they have been evaluated for their health and environmental safety, and the benefit-risk profile is positive - must be maintained in New Zealand. This is the only option that will support the development of a knowledge economy to sustain New Zealand’s long-term economic growth, raise living standards and ensure improvements in health outcomes. Genetic modification is an important biotechnological development that, when applied with appropriate safeguards and oversight by scientists, regulators and the public, will contribute significantly to this country’s economic and social development.
2. New Zealand's utilization of biotechnological developments must be flexible, and grounded in a regulatory framework that enables appropriate, scientifically-based, evaluation and control. Although this has largely applied to date, the recent “voluntary moratorium” on field testing and release of genetically modified organisms (GMOs) must be lifted, and GMO-containing medicines must not be subject to the Hazardous Substances and New Organisms (HSNO) Act - and to the Environmental Risk Management Authority’s (ERMA) jurisdiction, *as well as* all the regulations that apply to medicinal products (see sections B(m) and B(n) for more detail). Multiple regulatory oversight represents an unnecessary and costly duplication of effort. Generating application information, undertaking application review and compliance requirements, and undergoing monitoring by two different government agencies will create confusion and expense, exacerbated further if the requirements are inconsistent and incompatible. While the RMI accepts that GMO-containing medicines should have environmental effects evaluated and risks managed, it is unnecessary for such medicines to be under the jurisdiction of two separate regimes and agencies (see section B(n)).

3. Medicines produced through the activities of genetic modification (GM) are used widely in New Zealand to treat debilitating and, from both health and economic perspectives, significant diseases. In fact, the advent of gene technologies leading to the availability of GM therapeutics has revolutionized the health industry and markedly increased the benefits to human health. Examples of biotech-derived medicines in use in New Zealand include genetically engineered (GE) ‘human’ insulin for the treatment of diabetes; a genetically engineered ‘human’ growth hormone to treat growth retardation; recombinant Factors VII, VIII and IX to treat blood clotting disorders; GE erythropoietin for the treatment of anaemia; four medicines for cancer; interferon products to treat multiple sclerosis and chronic granulomatous disease; vaccines to fight hepatitis B; and hormones to treat infertility, to name a few. (See Section B(a) for more details).
4. Molecular biology, genomics and bioinformatics in the future will exert an ever more profound influence on new medicines' discovery and development. Already there are signs in this regard. While currently in this country there are over 20 protein products resulting from genetic modification and formulated as medicines available to treat human health problems, the American Food and Drug Administration (FDA) has approved for use in humans 76 genetically engineered biotechnology medicines, many of which are likely to make application for consent to distribute here. In addition, amongst pharmaceutical and biotechnology companies in the USA, there are 369 new biotechnology medicines in the development 'pipeline' targeting more than 200 diseases.
5. The most significant event recently, telling us what to expect in the future for the use of genetics in medicine, including but not limited to genetically modified organisms and products, is the work on the Human Genome Project. As the information obtained through the genome project is applied, and our knowledge about the involvement of genes in human disease expands, not only will the protein products of individual genes be produced in quantities large enough for therapeutic purposes - an extension of what is occurring already, but gene therapy also could be used to replace defective genes or incorporate corrective ones. For people with genetic disorders, this option is the only real hope for cure. In the future New Zealanders can anticipate gaining benefit from the use of genetic modification in the development of new medicines for many more diseases. This is true especially for populations with a genetic predisposition to certain diseases. For instance, both in the USA and New Zealand native populations particularly are prone to diabetes.
6. There are some potential risks of which account must be taken in a regulatory framework, such as personal risk from biotech-derived products, risk to the community, and risk to the environment. Biotechnology medicines, both their production and use, are regulated very tightly. In the USA, where most biologics have been developed, GM medicines are made in licensed facilities under Good Manufacturing Practice (GMP) with full oversight of the Food & Drug Administration (FDA). In addition, their use is by prescription under the guidance of a medical practitioner. They are fragile compounds and require carefully-controlled storage in order to maintain their efficacy. Their use in patients is controlled tightly and they are not released into the environment. Often injected, usually they are biodegraded rapidly which means that they pose no danger to the environment, even if released accidentally. Although derived through genetic modification, many such products do not themselves contain GMOs; many also are incapable of replicating genetic material. The existing regulatory framework enables products like these to demonstrate their proven safety, efficacy and quality profiles.

7. The risks from *avoidance* of biotech-derived medicines, however, are concrete and significant. At a minimum, the failure to treat the continuation of high levels of genetically-based diseases - such as diabetes in indigenous populations - would be devastating and cause untold, unacceptable, suffering. As described in Section B(a), a great number of patients suffering from a range of diseases negatively would be affected should New Zealand choose to impose restrictions on GM derived-medicines. Among many others who rely on GM-medicines, the over 30,000 diabetics using insulin would lose their biotech-derived product, a small number suffering from haemophilia and those with growth retardation would lose their treatments, thousands suffering from anaemia would lose their GE erythropoietin, 1000+ patients would lose GM-medicines to treat cancer, more than 700 would lose their treatment for blood clots and approximately 1000 women would lose out on the benefit of biotech-derived treatments for infertility.
8. Through international fora, New Zealand is involved in treaties, agreements and protocols world-wide that ensure dialogue and co-operation on matters regarding biotechnology and genetic modification. There is a commitment, therefore, to contributing to the global community and generally to 'pulling our weight' in the international arena regarding trade and the free movement of goods across borders. New Zealand's standing in the international arena severely would be in jeopardy if measures were taken to limit genetic modification activities and the resulting products.
9. Intellectual property (IP) protection is the cornerstone of the pharmaceutical and biotechnology industries. Stability and predictability of regulations over the long periods of time that it takes to develop innovative medicines is critical to their development and availability. Without solid IP protection, and consistent regulations, companies cannot take-on the investment of the, on average, over US\$500 million per product that is required to reach the market. Medicines derived from biotechnology warrant the same intellectual protection, and regulations based on sound-science, as those using classical medicinal chemistry. The production of biotechnology medicines has many challenges in addition to those experienced when developing drugs, such as requiring special facilities and knowledge for which investment over long periods is essential. Patent protection - for genes, their products and manufacturing processes - entirely is appropriate, and necessary to the development of these safe and effective preventives and therapies.
10. New Zealand people both personally and economically in three clear ways stand to gain from health-related biotechnology: it will generate from health therapies export income as high as \$1 billion over the next three years (The Sunday Star-Times (Auckland), July 16, 2000), it will save untold millions on traditional disease treatments for which new and efficient GM-medicines are being developed, and it will boost New Zealand's knowledge-based economy. One of the most critical strategic outcomes from the Royal Commission's inquiry must be for ongoing research activities involving genetic modification technology to continue, permitting the creation and the use of GMOs. This is the case particularly in the field of health-related biomedical research - one in which New Zealand health researchers already have proven expertise, demonstrating that this country has a competitive advantage in the research undertaken in our academic and medical research institutions. New Zealand's future as a productive, high-wage, knowledge-intensive and growing economy with high living standards - to which the population aspires - depends greatly on the extent to which the nation embraces concepts, and adopts strategies, that enable technological developments to occur. Furthermore, it depends and on the ability of knowledge-intensive industries, like the pharmaceutical

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industry, to operate and flourish in a sound and rational regulatory environment.

11. One has to question on what ethical basis one would consider denying patients in New Zealand access to the many new life-saving medicines derived from biotechnology. To deny a safe and effective medicine used elsewhere at the expense of life and limb would seem to warrant extremely solid foundation of known risk. A further ethical question for New Zealand is does it wish to be a partner in the global community in the development of future cures, or to adopt a ‘free-rider’ approach by seeking only the benefits of such research.
12. In conclusion, biotechnology offers for the 21st century the opportunity for breakthrough treatments. Rapid scientific advances—in biochemistry, molecular biology, cell biology, immunology, genetics, and information technology—are transforming drug discovery and development, paving the way for unprecedented progress in developing new medicines to conquer and prevent disease. New Zealand must seize upon the opportunity to develop its own biotech industry in order to boost the country’s knowledge-based economy and to contribute to global research in the fight against disease. A regulatory framework that ensures both flexibility and adequate precautions against risk is central to this effort.

6. Witness Briefs Attached

Witness Briefs

Provide a numbered list of the names and positions of witnesses from whom briefs are attached, including an indication as to whether or not you intend to present the witness at the formal hearings

Witness briefs must be provided to the Commission with your submission

Witness briefs should be prepared on Form 2

Dr. Gillian Woollett (Associate Vice President Biologics and Biotechnology at the Pharmaceutical Research and Manufacturers of America (PhRMA)) will submit a Witness Brief on behalf of RMI.

7. Submission by Section (as specified in the matters set out in the Warrant)

Submission by Section

Submissions are to be structured in line with the matters specified in the Warrant and the sections numbered accordingly

Each section should stand alone, and include a Section Summary, identifying the issues addressed in the section

Submissions may address all or only some of the sections (as specified in the Warrant). However section numbers should be retained, for example, if a submission addresses matters (a), (c) and (e), the sections shall be numbered (a), (c), and (e), rather than a, b, and c

Submissions may, within each section, adopt a sub-section approach using different headings; however, each paragraph should be consecutively numbered

Section A Recommendations

The Warrant has set the Commission the task of receiving representations upon, inquiring into, investigating, and reporting on the items set out in Section A (1) and (2)

below

Section A (1)

A (1) the strategic options available to enable New Zealand to address, now and in the future, genetic modification, genetically modified organisms, and products

Section A (1) Summary

1. The most appropriate strategic option for New Zealand is to adopt and embrace biotechnological developments in light of the benefits and opportunities for health and welfare currently that they bring and will bring in the future. Genetic modification technology must be allowed to occur and develop, but within an appropriate benefit-risk regulatory framework that enables flexibility, and in which suitable controls are applied. Similarly, the availability of products that arise through biotechnology - providing they have been evaluated for their health and environmental safety, and the benefit-risk profile is positive - must be maintained in New Zealand.
2. Embracing genetic modification within a framework of regulatory oversight and control will ensure its significant contribution to this country’s economic and social development.

A (1)

1. The most appropriate strategic option for New Zealand is to adopt and embrace biotechnological developments in light of the benefits and opportunities for health and welfare currently that they bring and will bring in the future. Genetic modification technology must be allowed to occur and develop, but within an appropriate benefit-risk regulatory framework that enables flexibility for different application types, and in which suitable controls are applied. Similarly, the availability of products that arise through biotechnology - providing they have been evaluated for their health and environmental safety, and the benefit-risk profile is positive - must be maintained in New Zealand. This is the only option that will support the development of a knowledge economy to sustain New Zealand’s long-term economic growth, raise living standards and ensure improvements in health outcomes.
2. Without involvement in genetic modification activities, and the products that arise, this country will lose any comparative advantage and international competitiveness, and the ability to be involved at the forefront of medical research and new drug development. The benefits of genetic modification in areas of medicine and human health care already are apparent and New Zealand has embraced GM technology in regard to medicines developed and made using biotechnology, albeit their manufacture is not in New Zealand. Examples of biotech-derived medicines in use in New Zealand include genetically engineered ‘human’ insulin for the treatment of diabetes; a genetically engineered ‘human’ growth hormone to treat growth retardation; recombinant Factors VII, VIII and IX to treat blood clotting disorders; GE erythropoietin for the treatment of anaemia; four medicines for cancer; interferon products to treat multiple sclerosis and chronic granulomatous disease; vaccines to fight hepatitis B; and hormones to treat infertility, to name a few. For New Zealand unilaterally to use the products of the technology but deny their research, development and manufacture would be unfortunate and imply a double-standard.
3. The Human Genome Project - established to sequence the entire human genome, identify and characterize all the genes and their variants (a disease gene is often a normal gene gone wrong, or one under inappropriate control), and the proteins for which they code - holds considerable

promise for medicine and human health. New Zealand scientists and researchers should not be denied the opportunity to be involved in a project with as far-reaching opportunities as this, and that represents one of the most impressive examples ever of global collaboration and cooperation.

4. New Zealand's response to biotechnological developments must be flexible, and it must be grounded in a regulatory framework that enables suitable, scientifically-valid, evaluation and control. This will be possible only if the “voluntary moratorium” on field testing and release of GMOs is lifted, and GMO-containing medicines are not subject both to the Hazardous Substances and New Organisms (HSNO) Act with oversight by the Environmental Risk Management Authority (ERMA), *as well as* all the regulations that apply to medicinal products (see sections B(m) and B(n) for more detail). Multiple regulatory oversight by different ministries represents an unnecessary and costly duplication of effort. Generating application information, application review, compliance requirements and on-going monitoring by two different government agencies will create confusion and expense, exacerbated further if the requirements are inconsistent and incompatible. While the RMI accepts that GMO-containing medicines should have environmental effects evaluated and risks managed, it is unnecessary for such medicines to be under the jurisdiction of two separate regimes and agencies. Genetic modification is an important biotechnological development that, when applied with appropriate rational safeguards and oversight by scientists, regulators and the public, will contribute significantly to this country’s economic and social development.

Section A (2)

A (2) any changes considered desirable to the current legislative, regulatory, policy, or institutional arrangements for addressing, in New Zealand, genetic modification, genetically modified organisms, and products

Section A (2) Summary

1. In the main, until the recent “voluntary moratorium” was imposed and the ambiguities of the HSNO Act as they pertain to medicinal products arose, the arrangements in New Zealand for addressing and controlling genetic modification, and genetically modified organisms and products, were appropriate. Furthermore, they were sufficiently robust to address both the human health and environmental safety concerns that are upper-most in the public's mind without overstating the risks or pre-supposing the outcome of further review by politicising the process unduly. To continue the sound scientific premise on which the biotechnology industry regulations already are based is appropriate. The current regulations could, however, be improved in a number of ways.

A (2)

1. A number of changes are necessary to improve the current statutory, regulatory and policy frameworks controlling genetic modification activities. These changes are recommended to ensure compliance costs remain appropriate to the level of risk involved, and to prevent duplication while streamlining the application processes. They are described below in brief and in greater detail in section B(n).

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2. As outlined in section B(b), all medicines are evaluated in New Zealand for their safety, effectiveness and quality and a statutory and regulatory framework (administered through the Medicines Act 1981 and the Medicines Regulations 1984) exists to control all aspects of their availability and use. This is the case both with conventionally-developed medicines and biotechnology medicines derived from genetic modification (but where the final product is not living), as well as vaccines containing live GMOs themselves. Through this thorough and exacting regulatory oversight the public can, and does, have confidence in the quality, safety and effectiveness of medicines that are marketed in this country. This regime should continue to operate consistently to all medicinal products to be used in humans, regardless of their derivation.
3. Currently, medicines that contain live GMOs - for example, vaccines - are subject to control under the HSNO Act and must receive approval from ERMA to be developed or imported, *in addition to* control under the medicines legislation and Ministry of Health approval. This is an unnecessary and costly duplication of effort, in terms of generating application information, of application and compliance costs and of monitoring by two different government agencies. Given this double jurisdiction, the potential exists for conflicting controls to apply to the same entity. The RMI, on behalf of the pharmaceutical industry in this country, seeks consistency such that no medicinal product that is the outcome of biotechnology and contains a GMO is required to be subject to the HSNO regulatory framework. Such products already are evaluated carefully and their use controlled as indicated in point 2. above. Further, while we should anticipate the development of cell-, and tissue-, based therapies (the first cell-based therapy already is available in the US) - some of which may represent genetically modified autologous and heterologous cells and possibly even xenotransplantation, we must continue to evaluate medicines on a case-by-case basis with the regulatory burden commensurate with the risk of the product, as well as its value to patients. It is worth noting that injectable biologics (including proteins, DNA, cells and even tissues) will not be excreted into the environment. Thus, inherently they are of lower risk than orally-administered comparable products, conventional small molecules or live agents.
4. While the RMI accepts that GMO-containing medicines must have environmental effects evaluated and risks managed, it is unnecessary for such medicines to be under the jurisdiction of two separate regimes and agencies that, even if they were to start out consistently, can be expected to evolve, or their regulations to be interpreted, differently.
5. In conclusion we would recommend strongly that GMO-containing medicines must be uncoupled from the HSNO regulatory framework. They must remain under the jurisdiction of one agency, the Ministry of Health Medsafe, and be subject only to the medicines legislation. The regulations administered by the Ministry of Health can evolve in a timely manner to accommodate the emerging technologies, such as gene therapy, that are related to GMOs but not necessarily included in the scope of the present discussions. The environmental impact of GMO medicines still would be evaluated - possibly even with the assistance of ERMA personnel. However, this must be done under the ambit of the medicines legislation with Medsafe co-ordinating the evaluation and carrying responsibility for the implementation of controls.

Section B Relevant Matters

The Warrant has set the Commission the task of receiving representations upon, inquiring into, and investigating, the matters set out in Section B (a) – (n) below

Section B (a)

B (a) where, how, and for what purpose genetic modification, genetically modified organisms, and products are being used in New Zealand at present

Section B (a) Summary

1. The pharmaceutical industry already is making extensive use of GM technologies and products in order to make available to consumers world-wide safer and more effective therapies for the treatment of disease and the improvement of human health. Biotech-derived insulin was the first product generally to become available when it was approved in 1982 in the US. New Zealanders suffering from specific diseases, including but far from limited to diabetes, have benefited from the availability of such medicines. In general, in this country there is a climate of acceptance regarding the products of GM technology being used for human health benefits.

B (a)

1. The researched-based international pharmaceutical industry, often in collaboration with academic and medical institutions, largely is responsible for the technological developments that have occurred, particularly since the middle of the 20th century, to bring to the market new and innovative pharmaceuticals for the diagnosis, treatment and prevention of disease. Traditionally, the public of New Zealand has had access to the products of this innovation through the decisions of international companies to seek approval to market such products in this country. This is the case both for the products of conventional development processes - such as chemical synthesis - and for those that result from the newer technologies such as recombinant DNA technology (also known as molecular biology, genetic modification and genetic engineering). In general, biotechnology medicines are not manufactured in New Zealand and few - only some vaccines - contain live agents.
2. Medicines produced through the activities of genetic modification (GM) are used widely in New Zealand to treat debilitating and, from an economic perspective, significant diseases. In fact, the advent of gene technologies leading to the availability of GM therapeutics has revolutionised the health industry and significantly has increased the benefits to human health. New Zealand has contributed to the early research and development of such medicines largely through pharmaceutical industry investment in biomedical research. While later-stage development and production have not been features of this country’s industry activities, its global nature, and its commitment to share the benefits, mean GM-derived medicines, like their traditionally-developed counterparts, are considered for availability in this country soon after their development. This certainly was the case with genetically engineered ‘human’ insulin - the first human protein produced through recombinant DNA technology to be approved for human use. Used for the **treatment of diabetes**, ‘human’ insulin was approved by the FDA in 1982 and became available in New Zealand soon after. In this country, currently more than 30,000 people are dependent on this product derived from bacteria genetically modified to carry the DNA sequence for human insulin – a small non-glycosylated protein of 23 amino acids. In addition to ‘human’ insulin, over 20 other protein products resulting from genetic modification and formulated as human medicines currently are marketed in this country - with the possibility of many more in the future (see section B(b)).
3. Treating **growth retardation** with genetically engineered ‘human’ growth hormone is the only

realistic and safe option available for New Zealanders. At present, PHARMAC has a capped budget for ‘human’ growth hormone and only a maximum of 155 patients per year can gain subsidised access to this medicine. If new indications are accepted then its use in adult replacement therapy will lead to more people gaining benefit from treatment. Such clinical trials for further indications are on-going.

4. To those with the genetic disorder that results in **haemophilia** - a blood clotting malfunction arising from the absence of specific clotting factors that halt excessive bleeding - the benefits of recombinant Factors VII, VIII and IX are self-evident. Supply problems for versions of the proteins derived from donated human blood, and safety concerns - such as HIV - surrounding the ‘natural’ therapies, are lessons from the past that should not be forgotten (see section B(b)). The number of people in New Zealand with the different forms of haemophilia who are treated with these GM products is small but for them this is life-improving, and in most cases life-saving, therapy.
5. Without recombinant erythropoietin - a hormone normally produced in the kidneys that stimulates the production of red blood cell for transporting oxygen from the lungs to tissues in the body, the **treatment of anaemia** following kidney disease and various cancers/chemotherapy treatments seriously would be impaired. Thousands of lives world-wide now are saved through the use of this biotechnology medicine although in New Zealand, where subsidised access is restricted, less than 500 patients on dialysis for chronic renal failure receive this medicine.
6. The treatment of many different **cancers** has been enhanced by the development of genetically modified human interferons - proteins that are involved in the regulation of immune responses. On the market in New Zealand are four GM medicines used for such cancers as hairy cell and chronic myeloid leukemias, Kaposi's sarcoma (often associated with AIDS), bladder cancer, malignant melanoma, malignant renal cell carcinoma, non-Hodgkin's lymphoma and for the treatment of chronic hepatitis B and C. From information provided by pharmaceutical companies supplying the products in this country, over 1000 patients per year are estimated to be receiving these medicines.
7. Other GM interferon products available in New Zealand treat **multiple sclerosis**, and **chronic granulomatous disease** - a rare genetic syndrome (incidence of approximately 1:500,000 population) characterised by persistent life-threatening infection. **Cystic fibrosis** treatment with a recombinant DNA product available here has offered new hope to those suffering from this debilitating genetic disorder that results in lung dysfunction and early death.
8. The development of recombinant haemopoietic growth factors has enabled defects in the body's defence mechanisms against infection to be reversed, especially in those with **congenital neutropenias** and **neutropenias resulting from cancer drug treatment**. In addition, these products are used to mobilise bone marrow stem cells (that manufacture other blood cells) in bone marrow transplantation.
9. **Liver cancer resulting from hepatitis B** is a major risk to the New Zealand population, particularly Maori and other minority or socioeconomically disadvantaged populations disproportionately who carry the virus. Hepatitis B is prevented extremely effectively by immunisation. The development of recombinant yeast technology for producing the hepatitis B vaccine, and its inclusion in the national immunisation scheme, has enabled a reduction in New

Zealand's rate of the disease regarded as approaching that of third world countries. This has a tremendous impact on the health and well-being of individuals otherwise who would be debilitated by infection, as well as reducing greatly the burden on the health care system through fewer infected people for whom to care or available to transmit the virus to others.

10. Several genetically modified medicine products are marketed in this country as antithrombotic agents for **dissolving blood clots**, thus reducing tissue damage following heart attack and stroke. Over 700 patients per year in New Zealand hospitals benefit from treatment of this nature.
11. Finally, in terms of the way in which the biotechnology products of the international pharmaceutical industry now are being used for the benefit of New Zealanders, there is the treatment of **infertility**. Genetically engineered follicle-stimulating hormone currently is used to treat approximately 1000 women with the use expected to grow both here and internationally.
12. With the medicines/therapies mentioned above, the active ingredient usually is a human protein that in bacteria, yeast or (sometimes) mammalian cells in culture is produced by recombinant DNA technology. The finished medicine product does not contain living genetically modified organisms, rather the GMOs are used exclusively as tools in the manufacturing process itself, with the organisms separated-out in the subsequent recovery process.
13. The only known GMO-containing medicine that could have been available in this country was an oral cholera vaccine containing a live attenuated GM cholera organism. Because of the “voluntary moratorium” on field testing and release of GMOs, the company seeking to distribute this medicine has been prevented from making application to ERMA under the HSNO Act, thus it is not available to the NZ public travelling to cholera-endemic regions. This is in spite of the product being evaluated by the New Zealand Ministry of Health as safe and effective for consent to market in this country, and having no environmental impact.

Section B (b)

<p>B (b) the evidence (including the scientific evidence), and the level of uncertainty, about the present and possible future use, in New Zealand, of genetic modification, genetically modified organisms, and products</p>
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<p>Section B (b) Summary</p>

1. Biotechnology medicines have contributed immensely to the quality, and quantity, of life for people worldwide, including New Zealand, suffering from a variety of devastating, and otherwise fatal, diseases. These medicines’ value to patients cannot be overestimated. To society as a whole, they allow people to function in the workplace and take care of their families when otherwise this would be impossible.
2. The New Zealand public can be assured that the current medicines legislative framework is capable of evaluating the human health and safety aspects of medicines that are derived from

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genetic modification or that contain GMOs. Their availability is assured for patients whose lives depend on them and the public also is assured that on-going oversight of their use occurs.

3. The RMI, on its member companies' behalf, asks that the commission recommend to government that the “voluntary moratorium” on GMO field testing and release is lifted to enable due legal process to occur.
4. Providing appropriate guidelines and controls apply regarding how gene, cell, and tissue, therapy is accessed and used, and providing a regulatory framework exists within which the new, and emerging, technologies safely can be practised, then New Zealanders should have access to such therapies and technologies. Such anticipation would allow within a stable regulatory regime the development of new products in which the benefit-risk profile to patients and the environment of a given therapy, conventional or biotechnological, can be assured, and the manufacturer’s investment encouraged. Arbitrary and unilateral regulations destroy the confidence of investors and new therapies simply will not become available to improve the health and quality of life for disease sufferers.

B (b)

Evidence of present use

1. The value of GM technologies and products, as evidenced by their present use in New Zealand in medicinal products, and the benefits that have accrued, particularly when compared to the alternatives, is compelling (also see above). In many cases, the GM medicine was developed following the significant limitations or lack of already existing therapies, or because existing production methods have not guaranteed sufficient quantities of the medicine to meet current health needs. A few examples now are outlined.
2. Prior to the advent of recombinant DNA technology, the proteins, hormones, growth factors and other regulatory molecules used to treat diseases were extracted from large volumes of human or animal body fluids such as blood and urine, and from human tissue such as cadavers' brains. In the case of insulin, the source material was pancreases from slaughtered animals - pigs or beef cattle. Proteins produced by genetic engineering are, by comparison, safer and more abundant, and their availability is paving the way for new opportunities in disease therapy.
3. For example, consider diabetes which is on the increase both world-wide and in New Zealand. Without the availability of ‘human’ GE insulin, the supply of high quality porcine and bovine insulin would be insufficient for all who need it. Further, both porcine and bovine insulin have allergenic potential that, combined with the animal pancreas supply problems, means GE insulin and its newer modifications will remain a safer, more reliable, and more abundant treatment option. While ‘human’ insulin genetically engineered from bacteria does differ slightly from that produced by the human pancreas - thus it can mount an immunological response resulting in treatment failure for some, this is a lesser risk than for that derived from animal sources. It is not an indication that something inherently is wrong with the GE version unequivocally that represents the best option available right now for patients. Further, the nature of the technology is such that controlled variants can be created such as the new version of ‘human’ insulin - Humalog or Lyspro – in which two amino acids are switched such that the complex is less stable and a shorter half-life for activity is ensured. This allows diabetics much better control of

their blood sugar with greater flexibility in when they eat. Thus it contributes greatly to the quality, as well as quantity, of life. Humalog cannot be made from natural sources.

4. Therapeutic products derived from human blood and blood products - blood clotting factors for haemophilia and erythropoietin for anaemia of kidney failure - ran the risk of, and in some cases resulted in, infection from blood-borne diseases such as AIDS, and hepatitis B and C. The alternatives derived from recombinant DNA technology do not have the same safety concerns. In addition, they are produced on a greater scale such that routine supply problems no longer occur. The process of producing medicines through genetic engineering leads to more rigorously-sourced, consistent, and safer, products - further evidence of their enhanced benefits.
5. Prior to the advent of GE growth hormone and GE follicle-stimulating hormone, treatment for growth retardation and infertility involved the use of human (cadaver-derived) pituitary tissue. The result was supply problems and expense, as well as real health risks from the transfer of Creutzfeldt-Jakob disease (CJD) - a close relative of “mad cow” disease. The availability of the GE-derived treatments has averted these problems and concerns as well as made the therapies more routine and widely available.

New Zealand's Current Regulatory Framework for Medicines

i. Medicines Legislation

6. All medicines, whether they are the result of conventional development processes or genetic modification, and whether or not they contain a genetically modified organism, have to be evaluated for their safety, efficacy and quality prior to being granted consent to market in New Zealand. This is the case regardless of their regulatory 'status' in other jurisdictions although account is taken of evaluations that are conducted by, say, the American, European and Australian medicines' control agencies.
7. The Ministry of Health Medsafe is responsible for undertaking the human health and safety evaluations for medicines and does so under the regulatory ambit of the Medicines Act 1981 and Medicines Regulations 1984. The act defines the term “medicine” such that anything for which a therapeutic claim (also defined) is made, is subject to the regulatory regime.
8. The information requirements that pharmaceutical companies must supply to the Ministry of Health in regard to, and in support of, their new medicines' applications are based on international standards and best practice. These comprehensive requirements are necessary to ensure detailed, and extensive, research about the medicines has been undertaken by the companies, and that rigour is applied to the analysis of the information gathered from pre-clinical and clinical studies. Given the comparative size of the New Zealand population, it is important appropriately to ‘value’ submissions accepted already by other markets and so reduce for companies the burden of reaching the New Zealand market. There is an effort led currently by Europe, Japan and the USA to harmonize international drug regulations and it is hoped New Zealand increasingly will recognize, and work to, these same standards. For any new medicine, regardless of its nature, the evaluation process involves investigation of:
 - the structure of the drug (active ingredient) that has been formulated into the medicine,
 - its developmental pathways and by-products during synthesis and production,

- its safety at the pre-clinical (animal toxicology) and clinical (human) development phase studies,
 - the manufacturing process for production of the formulated medicine (active and inactive ingredients),
 - environmental assessment (a requirement in the US and Europe),
 - its effectiveness for treatment of specific conditions for which claims are being made about the product, and,
 - in addition, the formulation of the drug into its pharmaceutical preparation for delivery to the patient (ie tablet, injection, topical lotion, etc), and its stability over the ‘life’ of the product, are confirmed through this evaluation process.
9. The purpose of this extensive, and thorough, regulatory approval process is to assure the public, using the best scientific means available, that all products granted consent to market meet the highest standards of safety and of quality in production, and that they will be effective for the conditions for which claims have been made. This is the case irrespective of whether the medicine is of conventional development and production, derived from genetic modification activities or contains a genetically-modified organism. Being granted ministerial consent to distribution means a medicine has been evaluated thoroughly and on balance is deemed to have benefits that outweigh any risks. Significant risks are controlled, or mitigated, through other means such as;
- specific requirements on the distribution of medicines,
 - access restrictions - through prescribing and sale restrictions - to ensure all these medicines are available and administered only under the strict supervision of medical practitioners,
 - information requirements - through such things as labelling, data sheets, consumer medicine information, etc.
10. Finally, through rigorous post-marketing surveillance (pharmacovigilance) activities undertaken both by the regulatory authorities in New Zealand and world-wide, and by pharmaceutical companies themselves, potential problems not detected in the pre-marketing evaluation phase can be highlighted and analysed. In the event of serious safety concerns where the balance moves from benefits to risks, a medicine is recalled and, in rare cases, consent is withdrawn.
11. Just as with conventionally-developed medicines, during production and purification processes GM-derived, and GMO-containing, medicines are, through Good Manufacturing Practice (GMP), subject to rigorous, internationally-followed, quality assurance and quality control measures. This is essential for consistency of product quality throughout its life cycle. This is especially so for biotechnology medicines used in New Zealand as their production is outside New Zealand and a single manufacturing source, often in the US, is used to supply many countries.
12. The New Zealand public can, therefore, be assured that the current medicines legislative framework is capable of evaluating the human health and safety aspects of medicines that are

derived from genetic modification or that contain GMOs. Their availability is assured for patients whose lives depend on them and the public also is assured that on-going oversight of their use occurs.

ii. The Hazardous Substances and New Organisms (HSNO) legislative regime

13. For medicines that contain genetically modified organisms, in addition to the regulatory framework applied through the medicines legislation, a second regulatory ‘hurdle’ exists. The Hazardous Substances and New Organisms (HSNO) Act requires that approval from the Environmental Risk Management Authority (ERMA) first must be obtained before any new organism (by definition this means any GMO) can be imported into, or developed within, NZ. There are no exceptions. The result is that medicines containing GMOs, and already that are comprehensively evaluated and controlled under the medicines legislation, are subject to this additional HSNO regulatory framework. Under the HSNO Act, such GMO-containing medicines have to be evaluated both for their human health and safety effects (duplicating the requirements under the medicines legislation given that such evaluations are its primary mandate), as well as for their effects on the environment throughout the entire life cycle of the product. The premise both of the HSNO Act and the Medicines Act is risk identification, analysis and management albeit that it is stated less explicitly in the latter's case. Both assume that unless a substance/medicine is so risky to human health and, from the HSNO perspective, to environmental health such that it should not be allowed in NZ, then providing all risks are identified and appropriate regimes developed and implemented to manage those risks, such substances can be available. Whichever regulatory oversight ministry applies, it must continue to presume the requirement of scientific evidence as the basis for subsequent decision making.
14. Vaccines are a useful case to examine in an attempt to clarify the aspirations of the new environmental oversight being proposed for some medicines. Some vaccines, but not all, contain live, attenuated, organisms. Where such organisms are the result of genetic modification then apparently they are also ‘captured’ by the HSNO legislative regime and will be subject both to a new medicine application to the Ministry of Health, and a HSNO application to ERMA. Even though the live vaccines attenuated using recombinant DNA technology have their alterations defined and characterized better, and in some ways are safer than those developed using conventional microbiological techniques, they will be subject to greater regulatory oversight for potential environmental impacts. Other vaccines, while not containing live, attenuated, bacteria or viruses, are developed using genetic engineering such that their status under the new rules is ambiguous.
15. To date, no new medicine containing a GMO has been evaluated by ERMA for its environmental safety, but a robust and rigorous framework exists already for such evaluation. The public can, therefore, have confidence not only that human health concerns will be addressed by the Ministry of Health, but also that, on a case-by-case basis, each medicine's impact on the environment will be evaluated. Most biotechnology products are injectables and as such cannot be excreted into the environment. It is their manufacture (already regulated tightly) that is more likely to impact the environment than their use. As part of the package of information for regulatory approval of a new biotechnology medicine in the USA and Europe, pharmaceutical companies undertake environmental impact studies to generate relevant data. That information could be made available to New Zealand regulatory authorities to fulfill current requirements for GMO-containing medicines to obtain ERMA approval under the HSNO Act. An entirely separate assessment by ERMA of all other aspects of a new biological

medicine’s application is unnecessary. Instead, ERMA’s expertise in environmental impact assessment more simply could be available to the Ministry of Health on a case-by-case basis. This would be least burdensome - to those who seek to supply of biotechnology medicines to New Zealand, to the regulatory system and to those for whom continued availability of such products is necessary.

16. The RMI, on its member companies' behalf, asks that the commission recommend to government that the “voluntary moratorium” on GMO field testing and release is lifted to enable due legal process to occur.
17. Comment on the need for reform of the HSNO regulatory framework to exclude GMO-containing medicines, and the implications for Trans Tasman Mutual Recognition Arrangement (TTMRA) from the HSNO regime applying to such medicines, is covered in section B(m).

Possible future use

18. Molecular biology, genomics and bioinformatics in the future will exert a profound influence on the discovery and development of new medicines, as well as on the nature of their manufacture. Already there are signs in this regard. While currently in this country there are over 20 protein products resulting from genetic modification and formulated as medicines available to treat human health problems, the American FDA has approved for use in humans 76 genetically engineered biotechnology medicines, many of which are likely to make application for consent to distribute here. In addition, amongst pharmaceutical and biotechnology companies in the USA, there are 369 new biotechnology medicines in the development 'pipeline' targeting more than 200 diseases. Nearly half of these new medicines (175) target various forms of cancer - some using novel approaches. Infectious diseases, such as hepatitis, genital herpes, urinary tract infections, tuberculosis, etc, are the focus for 39 biotechnology medicines' development projects. Autoimmune diseases - such as rheumatoid arthritis and systemic lupus erythematosus, and digestive disorders - eg, Crohn's disease and acute pancreatitis, are the target respectively of 39 and 11 new medicines in the 'pipeline'.
19. Of great significance to medicinal biotechnology - telling us what to expect in the future for the use of genetics in medicine, including but not limited to genetically modified organisms and products - is the work on the Human Genome Project. A draft will be published this year of the map and sequence for the entire human genome. Gene malfunction is central to many human health problems and in the future is likely to be found as the underlying cause or contributor to many more. Several hundred inherited diseases involve one single gene while others, such as diabetes, heart disease and asthma, result from defects in several different genes, some of which may be inherited. Furthermore, diseases such as cancer can result from gene defects in various tissues occurring during development and adult life. The elucidation of the genes represented ultimately will enable determination of the proteins made by specific genes, and the function of each gene. As the information obtained through the genome project is applied, and our knowledge about the involvement of genes in human disease expands, not only will the protein products of individual genes be produced in quantities large enough for therapeutic purposes - an extension of what is occurring already, but gene therapy also could be used to replace defective genes or incorporate corrective ones. For people with genetic disorders, this option is best hope for a cure. The appropriate regulatory framework for gene therapy also will be important in order for society to realize these potential future benefits. It should not be

forgotten that genetic technologies contribute also to the R&D on conventional drugs and therapies – the remainder of the 1000 or so medicines already in clinical trials in the USA. Finally, cell therapies, and tissue replacements, will become possible. The first cell therapy already is available in the USA.

- 20. Providing appropriate guidelines and controls apply regarding how gene, cell, and tissue, therapy is accessed and used, and providing a regulatory framework exists within which the new, and emerging, technologies safely can be practised, then New Zealanders should have access to such therapies and technologies. Such anticipation would allow within a stable regulatory regime the development of new products in which the benefit-risk profile to patients and the environment of a given therapy, conventional or biotechnological, can be assured, and the manufacturer’s investment encouraged. Arbitrary and unilateral regulations destroy the confidence of investors and new therapies simply will not become available to improve the health and quality of life for disease sufferers.

Section B (c)

B (c) the risks of, and the benefits to be derived from, the use or avoidance of genetic modification, genetically modified organisms, and products in New Zealand, including:

- (i) the groups of persons who are likely to be advantaged by each of those benefits
- (ii) the groups of persons who are likely to be disadvantaged by each of those risks

Section B (c) Summary

- 1. New Zealanders benefit already from the use of genetic modification in the development of new medicines and in the future can anticipate doing so for many more diseases. This especially is true for populations with a genetic predisposition to certain diseases, but also for all who can expect exposure to routine illnesses caused by infectious diseases. In both the US and New Zealand, native populations particularly are prone to diabetes - an example of the first category. Naturally-sourced medicines have been available for many years but limitations in supply, and concerns about the transmission of infectious agents, convey great advantages to the biotechnology-based alternatives. In the second category, vaccines - both conventional and biotech - have been great contributors to public health. New Zealanders of European-decent also may look forward to biotech-derived medicines currently in development to treat diseases such as osteoporosis.
- 2. The greatest risk is from avoidance of GM technologies. Not only will New Zealanders be denied access to the therapeutic treatment options arising from the technologies, but in addition the down-stream benefits from increased research and economic activities, and from better public health and welfare, will not be realised.

B (c)(i)

Below are a couple of examples of the positive contribution already-demonstrated by biotechnology-driven medicine. Many more have been discussed above.

- 1. Maori have diabetes incidence, and death, rates higher than for non-Maori (according to Professor Mason Durie, as reported in The Press (Christchurch) 5 October 2000, in 1997 72 per 100,000 Maori died from diabetes compared with 8 per 100,000 for non-Maori). Similarly, Hepatitis B is a debilitator and killer, and the socioeconomic circumstances of minority and

disadvantaged populations mean that vaccines against the disease have disproportionate value to these groups. While accurate figures are difficult to obtain, a recently-published study indicates that the prevalence of Hepatitis B is about 5% in Maori, Pacific Islanders and other ethnic minorities, and 0.5% in New Zealanders of European origin (New Ethicals Journal, 1998 Vol 1, No. 11, pg 61). GM-derived opportunities to prevent it, and other infectious diseases for which vaccines are available, could have tremendous impact on public health.

2. The population of European-decent do, and will, benefit from future biotech-derived medicines. Osteoporosis, for example, affects almost 60 per cent of women and 30 per cent of men over the age of 60 years. The fractures associated with this condition occur most commonly at the spine, wrist, and hip, and nearly a third of people with hip fractures die within a year from complications. More hospital beds are taken up with complications of osteoporosis than with most other common medical conditions. While one estimate of annual financial cost to New Zealand is NZ\$20 million (The Press, 19 October 2000), there are suggestions that the true cost might be in the vicinity of NZ\$150-200million (NZ National Health Committee Publication on Osteoporosis). At least three biotech-derived treatments for osteoporosis currently are in development. One promising candidate is a cholesterol-lowering drug that could represent a new approach to treating the disease by replacing bone already that has deteriorated. Current treatments stop, or slow, bone loss (Chemical News & Intelligence, 3 December 1999).
3. Stroke and heart disease claim more lives, and cost the nation more, than any other health disorder. Approximately 8000 deaths a year in New Zealand are attributed to heart disease (Otago University School of Medical Sciences website publication “Diseases of the Heart”, 1998), while of those who survive, the morbidity costs are a drain on the limited health care budget. Stroke costs the New Zealand taxpayer \$58million per year from hospital charges alone (“Understanding Stroke - Statistics”, The Stoke Foundation website) while Scott & Scott found in 1992 that the direct costs of treating patients with ischaemic stroke ranged from NZ\$98million to NZ\$140million (NZ Med J 1994; 107:443-6). Innovative solutions are needed to reduce the morbidity and mortality of these diseases. Such solutions are being investigated through gene therapy, genetic modification and the development of new biotechnology medicines. The benefits are significant to the individuals affected with the diseases, and huge to public health and welfare, not to mention tax payers. At least six new biotech therapies for stroke are in development in the US while 26 target heart disease.

B (c)(ii)

1. There are some limited risks in the use of biotechnology-derived medicines of which account must be taken but most apply to the individual being treated since the products are powerful pharmacologic products. However, because most are labile and, through their routine use, are injected into the body, the exposure of the environment is minimal - they are not excreted in the manner of conventional drugs. Nor do they accumulate in people or the environment because they are not stable chemical entities.
2. The risks to human health from *avoidance* of biotech-derived medicines, however, are concrete and significant. At a minimum, the failure to treat the continuation of high levels of genetically-based diseases - such as diabetes in indigenous populations - would be devastating and cause untold, unacceptable, suffering. As described in Section B(a), a great number of patients suffering from a range of diseases negatively would be affected should New Zealand choose to impose restrictions on GM derived-medicines. Among many others who rely on GM-

medicines, the over 30,000 diabetics using insulin would lose their biotech-derived product, a small number suffering from haemophilia and those with growth retardation would lose their treatments, thousands suffering from anaemia would lose their GE erythropoietin, 1000+ patients would lose GM-medicines to treat cancer, more than 700 would lose their treatment for blood clots and approximately 1000 women would lose out on the benefit of biotech-derived treatments for infertility. Surely it cannot be proposed that existing protein products developed using genetic engineering will be denied to patients? Furthermore, New Zealanders must not be denied the opportunities in the future to access new biotech products and gene therapies that are developed and made available in compliance within appropriate guidelines.

Section B (d)

B (d) the international legal obligations of New Zealand in relation to genetic modification, genetically modified organisms, and products

Section B (d) Summary

1. Through international fora, New Zealand is involved in treaties, agreements and protocols world-wide that ensure continued dialogue and co-operation on matters regarding biotechnology and genetic modification. There is a commitment to contributing to the global community and generally to 'pulling our weight' in the international arena regarding trade and the free movement of goods across borders.
2. That commitment shown by New Zealand in participating in international biotechnology-issues fora must translate to a willingness for GM activities actually to occur in this country - providing appropriate protocols and regulatory requirements are upheld.
3. The public in this country benefits immeasurably from the New Zealand pharmaceutical industry’s interaction with the international pharmaceutical community, none more so than when it supports New Zealand-based genetics research, and when the therapeutic products of collaborative research are available here. New Zealand must remain in ‘good standing’ within the global community and comply with the legal obligations that ensue.

B (d)

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2. That commitment shown by New Zealand in participating in international biotechnology-issues fora must translate to a willingness for GM activities actually to occur in this country - providing appropriate protocols and regulatory requirements are upheld. New Zealand is signatory to a number of World Trade Organisation (WTO) Agreements that relate to biotech. The Agreement on Technical Barriers to Trade must place on New Zealand an obligation to

ensure additional regulatory hurdles do not exist for biotech therapies, as would be the case if GM activities severely were constrained, or banned outright. Similarly, with New Zealand’s legal obligation, through its WTO membership, to abide by rules designed to facilitate international trade. A ban on GM activities and products would seem an infringement of other WTO countries’ rights to trade with New Zealand in that regard.

3. Under TTMRA, New Zealand and Australia seek to align their regulatory regimes for therapeutic products. Any restrictions here on GM technologies and products, and additional regulatory ‘hurdles’ - such as GMO-containing medicines requiring two regulatory approvals compared only to the one in Australia, have considerable implications in terms of barriers to trade.
4. The public in this country benefits immeasurably from the New Zealand pharmaceutical industry’s interaction with the international pharmaceutical community, none more so than when it supports New Zealand-based genetics research, and when the therapeutic products of collaborative research are available here. New Zealand must remain in ‘good standing’ within the global community and comply with the legal obligations that ensue.

Section B (e)

B (e) the liability issues involved, or likely to be involved, now or in the future, in relation to the use, in New Zealand, of genetic modification, genetically modified organisms, and products

Section B (e) Summary

1. In the United States, where most GM-derived medicines are developed, biotechnology medicines are subject to approval by the Food and Drug Administration’s Center for Biologics Evaluation and Research (CBER). Biologics are subject to strict regulations both for their manufacture and licensing under CBER. CBER approval, however, does not confer any protection from liability. In the US, the ultimate deterrence is the US court system, with its traditionally high dollar settlements. It is, therefore, in the interest of industry to conduct due diligence in all aspects of drug/biologic development. The combination of strict regulations and industry self-regulation has worked well in the US. The fact that 76 medical biologic products already are on the market there, and that 4/5 of all process foods available in US supermarkets contain GMOs - with little public outcry against biotechnology, and few court cases involving biotech products, attests to a level of confidence regarding genetic modification in foods and therapeutics. Americans appreciate the value and quality of the goods made using genetic technologies and are not averse to the development of new ways of doing things. A similar system of adequate controls and industry self-regulation already serves New Zealand well and, with flexibility, can deal with new technologies and products of the future.
2. New Zealand has a variety of statutes, and the law of negligence, under which product liability issues can be pursued. In addition, the fact that biotech medicines approved for use in this country first have approvals from other jurisdictions provides a measure of ‘comfort’ regarding

their safety and quality.

B (e)

1. In the United States, where most GM-derived medicines are developed, biotechnology medicines are subject to approval by the Food and Drug Administration’s Center for Biologics Evaluation and Research (CBER). Every step of the development and production process is regulated highly (as is the case for conventionally-developed medicines), and prior approval from the regulator is required for every change, eg, to a piece of equipment or to any component of the manufacturing process. Product safety and quality, therefore, are ‘built-in’ to the biotech medicine - as for every medicine.
2. Although its regulations are strict and enforced very thoroughly, CBER approval does not confer any protection from liability. In the US, the ultimate deterrence to any dangerous products being distributed is the US court system, with its traditionally high dollar settlements. It is, therefore, in the interest of the biotech industry in the US to conduct due diligence during all phases of drug development, manufacture and marketing. The combination of strict regulations and industry self-regulation has worked well in the US. The fact that 76 medical biologic products already are on the market there, and that 4/5 of all process foods available in US supermarkets contain GMOs - with little public outcry against biotechnology, and few court cases involving biotech products, attests to a level of confidence regarding genetic modification in foods and therapeutics. Americans appreciate the value and quality of the goods made using genetic technologies and are not averse to the development of new ways of doing things. A similar system of adequate controls and industry self-regulation already serves New Zealand well and, with flexibility, can deal with new technologies and products of the future.
3. The fact that biotech medicines approved for use in this country first have approvals from other jurisdictions overseas - CBER approval in the US, Medicines Control Agency in the UK and Europe, and Therapeutic Goods Administration authority in Australia - provides a measure of ‘comfort’ regarding their safety and quality. Nevertheless, New Zealand does have a variety of statutes, and the law of negligence, under which product liability issues can be pursued. The Sale of Goods Act and the Consumer Guarantees Act require goods sold to consumers to be merchantable and of acceptable quality. There are statutorily-implied undertakings to this effect in supply transactions. In addition, a claim is possible for the negligent manufacture of a defective product. In this same context, there is also the possibility of a claim under the Fair Trading Act for misleading and deceptive conduct on the basis that the product does not measure up to the claims for it. All of this is, however, subject to New Zealand’s accident compensation legislation that prohibits claims for personal injury or medical misadventure. This is likely to prevent most personal claims arising out of product liability situations, in which case the exposure for damages often will be limited to reimbursement of product costs, and any special damages that are not statute-barred. Although claims for exemplary damages are not covered by the statutory proscription on personal injury/medical misadventure claims, these will arise only where there is an insolent disregard of a consumer’s position.

Section B (f)

B (f) the intellectual property issues involved, or likely to be involved, now or in the future, in relation to the use in New Zealand of genetic modification, genetically modified

organisms, and products

Section B (f) Summary

1. Intellectual property (IP) protection is the cornerstone of the pharmaceutical and biotechnology industries and, along with stability and predictability of regulations, it is essential to the availability of new medicinal therapies. Without solid IP protection, companies could not afford to invest the average of over US\$500 million per product that reaches the market. Medicines derived from biotechnology warrant the same intellectual protection as those using classical medicinal chemistry.

B (f)

1. Intellectual property (IP) protection is the cornerstone of the pharmaceutical and biotechnology industries and, along with stability and predictability of regulations, it is essential to the availability of new medicinal therapies. Without solid IP protection, companies could not afford to invest the average of over US\$500 million per product that reaches the market. Medicines derived from biotechnology warrant the same intellectual protection as those using classical medicinal chemistry. The production of biotechnology medicines has many challenges in addition to those experienced when developing drugs, such as requiring special facilities, and knowledge, for which investment over long periods is essential. Patent protection for genes as they are discovered, their products and manufacturing processes, is entirely appropriate, and is necessary to the development of these safe and effective preventives and therapies.
2. New Zealand stands to lose intellectual property, as well as the economic benefits associated with it, if it does not maintain the regulatory framework, and the financial incentives, for biological research to be conducted in New Zealand. An appropriate IP protection regime also ultimately could contribute to the New Zealand development and manufacture of biotechnology medicines to benefit its people. Furthermore, without proper IP protection, biotechnology medicines may never be made available in this country - the same effect as a ban on the technology and products.

Section B (h)

B (h) the global developments and issues that may influence the manner in which New Zealand may use, or limit the use of, genetic modification, genetically modified organisms, and products

Section B (h) Summary

1. The pharmaceutical and biotechnology industries are global. Products become available in increasingly synchronous manner in the principal markets (US, Europe and Japan). Regulations world-wide are being coordinated to ensure less duplicative research and more ready access to the therapies for patients. While not a global leader, NZ can be an active contributor to, as well as a beneficiary of, the therapies that biotechnology enables.

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1. The pharmaceutical and biotechnology industries are global. Products become available in increasingly synchronous manner in the principal markets (US, Europe and Japan). Regulations world-wide are being coordinated to ensure less duplicative research and more ready access to the therapies for patients. While not a global leader, NZ can be an active contributor to, as well

as a beneficiary of, the therapies that biotechnology enables. Increasingly, biomedical research is a real-time global collaboration. For example the sequencing of the human genome, and the consortium looking at the most common type of genetic variation - the single nucleotide polymorphism (SNP), represent global public and private efforts at collaboration. Both have been successful – completed under budget and ahead of schedule in both cases. With the development of more and more real-time communication tools there is no reason that New Zealand scientists have to leave the islands in order to contribute effectively.

Section B (i)

B (i) the opportunities that may be open to New Zealand from the use or avoidance of genetic modification, genetically modified organisms, and products
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Section B (i) Summary

1. A modern, robust economy is built on linkages in the areas of knowledge, learning, innovation, technology, public health, and the like. Such linkages are critical to growth in productivity, growth in real wages, export expansion, and to the creation and maintenance of competitive advantage. A vibrant pharmaceutical industry that makes significant contributions to a knowledge economy, and boosts economic health and wealth, should be encouraged. A rational government will nurture such an industry. It is critical to the success of New Zealand’s drive to develop and maintain a knowledge economy that biomedical research and biotechnology activities - the cornerstone of the pharmaceutical industry now and in the future, are allowed to continue.

B (i)

1. A modern, robust economy is built on linkages in the areas of knowledge, learning, innovation, technology, public health, and the like. Such linkages are critical to growth in productivity, growth in real wages, export expansion, and to the creation and maintenance of competitive advantage.
2. The pharmaceutical industry is a prime example of a global knowledge-intensive industry. Its sophisticated R&D necessitates strong links to other components of the knowledge economy, including academic institutions, medical institutions, manufacturing facilities, and the like. The pharmaceutical industry’s products, and contributions to research, facilitate improved health outcomes and reduce hospital-based care and costs, as well as immediately and directly affecting the well-being of individuals and populations.
3. Real opportunities exist in this country for collaboration in the areas of biomedicine and biotechnology. Genetic modification features significantly already as part of biotechnological innovation in pharmaceuticals around the world and New Zealand is playing its part in this regard. To ensure its increased participation, the doors must not be closed on genetic modification activities and GM products.
4. The benefits far outweigh the risks. Product-by-product, GMO-by-GMO, the limited risks, and the great benefits, from biotechnology can be managed through the relevant regulatory regimes already that exist in this country. The pharmaceutical industry spends vast amounts of money on R&D (in 1998, the top 10 leading companies spent around US\$17,900million), increasingly

for biomedical and biotechnology research involving GM-activities. If New Zealand is to attract a growing share of such research, this country must embrace biotech activities, particularly in areas that will improve human health where public demand is most immediate. Many collaborative activities exist currently in this country between the pharmaceutical industry and GM research facilities - see, for example, submissions to the Royal Commission from The Malagan Institute of Medical Research, Genesis Research and Development Corporation and the various university medical schools.

5. Increased restrictions on biotech research would cause New Zealand to lose out on medical and clinical research, and on scientific expertise, and would diminish a significant component of this country’s knowledge society. Pharmaceutical and biotech companies would lose investment, employment opportunities would shrink, and, over time, any competitive advantage New Zealand has developed in the science and medical research fields would disappear.
6. By far the worst impact, however, of increased restrictions on biotechnology such that GM-derived medicines, and gene therapies, cease to be made available without undue regulatory penalties, would be on human health outcomes for New Zealanders. Biotech therapies offer life and death alternatives to people. Further, as the rest of the world proceeds with the better biotech alternatives use of the older, naturally-sourced, products that are available increasingly will become less ethical, and supply less economic. Since New Zealand makes few of its own therapies, and does not have the market share to influence global markets to supply to its specifications, it will have a very stark choice - the biotech products or none. A vibrant pharmaceutical industry that makes significant contributions to a knowledge economy, and boosts economic health and wealth, should be encouraged. A rational government will nurture such an industry.

Section B (j)

B (j) the main areas of public interest in genetic modification, genetically modified organisms, and products, including those related to:

- (i) human health (including biomedical, food safety, and consumer choice)
- (ii) environmental matters (including biodiversity, biosecurity issues, and the health of ecosystems)
- (iii) economic matters (including research and innovation, business development, primary production, and exports)
- (iv) cultural and ethical concerns

Section B (j) Summary

1. Biotechnology offers the opportunity for breakthrough treatments for the 21st century. Rapid scientific advances - in biochemistry, molecular biology, cell biology, immunology, genetics, and information technology - are transforming drug discovery and development, and paving the way for unprecedented progress in developing new medicines to conquer and prevent disease. Understanding the molecular basis of disease already has altered the way in which we approach the development of drugs and biologics to fulfill unmet medical needs. The completion of the Human Genome Project, along with the greater understanding of model species and infectious agents, will enhance this further. The efforts are global, the public-private partnership is synergistic and every step builds on those before in a worldwide iterative effort.

2. If patients in New Zealand are to benefit from the biotechnology revolution, the regulatory framework must guarantee both the importation of biotech-derived medicines, potentially including both cells, genes and tissues, and the ability of researchers in New Zealand to contribute to the development of cures for diseases within and beyond New Zealand’s borders. The opportunities are far more than can be pursued but, for optimal development and availability to patients, all countries with capabilities both public and private should be encouraged to work together in the interests of their own population, and others.
3. Biotechnology medicines, both their production and use, are regulated very tightly. In the USA, where most biologics have been developed, GM medicines are made in licensed facilities under Good Manufacturing Practice (GMP) with full oversight of the FDA. IN addition, their use is by prescription under the guidance of a medical practitioner. They are fragile compounds and require carefully-controlled storage in order to maintain their efficacy. Their use in patients also is controlled tightly and they are not released into the environment. Often injected, usually they are biodegraded rapidly which means that they pose no danger to the environment, even if they are released accidentally. The live agents that are used in their manufacture represent almost priceless intellectual property and even if viable in the environment, they are only ever used in carefully-contained circumstances.
4. In three clear ways New Zealand stands economically to gain from health-related biotechnology: over the next three years it could generate from health therapies export income as high as \$1 billion (The Sunday Star-Times (Auckland), July 16, 2000), it could save untold millions on traditional disease treatments for which new and efficient GM medicines are being developed, and it could boost New Zealand’s knowledge-based economy.
5. On ethical matters, it has to be questioned on what basis one would consider denying patients in New Zealand access to the many new life-saving medicines developed using biotechnology. Straight economic reasons are insufficient when the new therapies often are more cost-effective than previous options, offer better quality of life and, in the case of vaccines, enable prevention of devastating infectious diseases. As problems with infectious diseases continue to challenge public health systems worldwide, vaccines can become the only hope.
6. A further ethical question is whether New Zealand can allow itself to accept the final products of biotechnology in the form of imported medicines, but refuse to allow biotech research to take place on New Zealand soil.

B (j)(i)

1. Biotechnology offers the opportunity for breakthrough treatments for the 21st century. Rapid scientific advances - in biochemistry, molecular biology, cell biology, immunology, genetics, and information technology - are transforming drug discovery and development, and paving the way for unprecedented progress in developing new medicines to conquer and prevent disease. Understanding the molecular basis of disease already has altered the way in which we approach the development of drugs and biologics to fulfill unmet medical needs. The completion of the Human Genome Project, along with the greater understanding of model species and infectious agents, will enhance this further. The efforts are global, the public-private partnership is synergistic and every step builds on those before in a worldwide iterative effort. For example, in the 1980s, scientists identified the gene in which errors cause cystic fibrosis; it took nine years. Last year, scientists located the gene that causes Parkinson's disease—in only nine days. Within a decade, there is hope that gene chips will offer a ‘road map’ that enables the

prevention of illnesses throughout a lifetime. Such opportunities allow informed personal decisions and life style choices. Also, by providing opportunities to treat earlier, and not having to wait for debilitating symptoms in order to provide an accurate diagnosis, there is the opportunity considerably to reduce suffering as well as reduce the efficacy hurdle confronted by a given therapy.

2. Biotechnology offers new approaches to the discovery, design, and production of medicines, vaccines, and diagnostics. The new technology will make it possible to:
 - Prevent, cure, and treat more diseases than is possible with conventional therapies, including those for which no therapies currently are available.
 - Develop more precise and effective new medicines with fewer side effects.
 - Anticipate and prevent disease rather than just react to disease symptoms.
 - Produce replacement human proteins on a large scale otherwise that would not be available in sufficient quantities. Such already has been demonstrated with insulin for diabetics and erythropoietin for anaemic cancer patients.
 - Eliminate the contamination risks of infectious pathogens by avoiding the use of human and animal sources for raw materials, such as with the use of recombinant Factor VIII for the treatment of haemophilia and human growth hormone for growth-deficient children.
 - Build on our understanding of naturally occurring compounds to design improved biologics with special properties such as Humalog, the more rapidly reacting variant of insulin.
3. With modern biological science, particularly genomics - the study of genes and their function, we understand better the underlying causes of disease and the ways in which drugs/biologics operate. This enables more rational design approaches to create better new therapies. New technologies, including combinatorial chemistry, high-throughput screening and laboratories-on-a-chip, offer better ways to turn the new knowledge into molecules, both conventional and biotech, for testing. And the use of genomics, coupled with modern information technology and vastly increased computational capabilities, is refining the processes by which diseases are defined and diagnosed, molecules are generated and tested, and data are analyzed and processed. We are at a wonderful point in biology where multiple scientific and technical fields are working synergistically vastly to help increase the array of viable approaches for research ultimately that will make available to patients and their families totally new therapeutic options.
4. Among the 76 biologic products already on the market in the United States - more than 20 of which are used in New Zealand - are treatments for heart attack, stroke, breast cancer, multiple sclerosis, human growth deficiency, rheumatoid arthritis, Crohn's disease, Gaucher's disease, anemia associated with chronic renal failure, diabetes, hairy cell leukemia, haemophilia A, and cystic fibrosis. Vaccines have been approved for single diseases and in combination such as hepatitis B, Haemophilus b with acellular pertussis, Haemophilus influenzae type b diseases, which include meningitis and hepatitis B virus, and for diphtheria, tetanus, and pertussis. Some of these diseases affect more people than others, but all have had a tremendous impact on individuals' lives, and all have demonstrated over many years (the first approved biotech

product in the US was in 1982) just how safe, effective and cost-effective biotech medicines can be. The prospects for the future are even better.

5. In the last three years alone, 28 new biologic products were approved in the US. They include:
 - The first monoclonal antibody for one type of metastatic breast cancer.
 - The first recombinant clotting factor for haemophilia B, an inherited disorder almost exclusively that affects males and results in frequent hemorrhages.
 - The first biologic that promotes production of the body's platelet supply in patients undergoing chemotherapy for solid tumours or lymphoma.
 - The first monoclonal antibody for therapeutic use in cancer (non-Hodgkin's lymphoma).
 - A genetically engineered injectable for rheumatoid arthritis.
 - The first humanized monoclonal antibody to help prevent acute kidney transplant rejection.
 - A bioengineered, non-naturally occurring recombinant type-1 interferon for chronic hepatitis C viral (HCV) infection.
 - A once-weekly injectable for relapsing forms of multiple sclerosis.
 - A thrombolytic agent for heart attacks.
 - A biologic to aid in the prevention of respiratory syncytial virus (RSV) disease in children under 24 months.
6. Recent developments in genomics are allowing scientists, public and private, world-wide to study genes on a very large scale—tens of thousands of new genes have been discovered each year since 1993—and build a catalogue that will encompass all human genes. The first draft of the human genome will be published this Northern Hemisphere winter with the final version complete by 2003.
7. There is a direct relationship between gene discovery and the identification of new drugs. It is estimated that there are about 100,000 different human genes, each containing the instructions for making one or more proteins. The more genes that are identified, the more targets that are available for drug discovery. Currently, about 500 genes are being targeted for drug interventions. That figure is expected to increase between 6 and 20 fold - to 3,000 to 10,000 genes - once the genome project is completed. Discovery of new genes can also lead to new diagnostics for the early detection of disease, permitting the timely use of drugs and other therapies that in some cases prevent irreversible damage or delay the onset of debilitating symptoms. To target those most prone to specific diseases will enable such treatments economically to be viable.
8. Most drugs now work by binding to a specific protein, altering its activity to achieve the desired outcome (e.g., improve symptoms, eradicate infection). Proteins also can function as drugs themselves, not just as drug targets. Protein drugs are useful when the body makes too little of

an important protein or when the presence of unusually large amounts of a protein can reverse or arrest a disease process. Protein drugs were made possible by the first biotechnology revolution: the industrial-scale production of proteins through genetic engineering. This was just the first step but has demonstrated the high safety profile for biotechnology medicines. Patients who have had heart attacks and receive clot-dissolvers, patients with renal failure who receive anaemia-combating erythropoietin, and patients with diabetes who receive human insulin are among the current beneficiaries of protein drugs. Through genomics, scientists have discovered many previously unknown proteins that can be explored for use as potential drug targets or biologics.

9. Among other uses, new genetic technology is being explored to develop vaccines to prevent or treat diseases previously that have eluded traditional vaccines. Examples include AIDS, malaria, tuberculosis, and cervical cancer. While still in the very early stages of testing, DNA vaccines, which use snippets of genetic code to induce powerful defenses against disease, are considered highly promising.
10. Related technology is being used to develop so-called gene therapy - the initial candidates being terminal patients who have no other options. Cancer is a major cause of death in New Zealand. Traditional forms of therapy remain surgery, radiation therapy, and chemotherapy, but genetic research is offering increasing hope of more precise and effective treatments, with far fewer side effects. About 175 biologics are in development for cancer and related conditions, including medicines for cancers of the breast, prostate, lung, colon, liver, ovary, pancreas, and kidney. Most cancers are not inherited genetic diseases but result from spontaneous mutations in a cell's genes, particularly those controlling cell growth, such as the tumor-suppressor genes. Mutation of the suppressor gene p53, for example, has been detected in nearly half of all human cancers. Tumors usually form after cells divide in an uncontrolled manner because growth-regulating proteins are overproduced or under-produced, and signals are insufficient to alert the immune system to the problems.
11. While they have a long way to go, new approaches with gene therapy - the introduction of genetic material into cells of the body - that involve manipulating genes and using their properties to halt cancer or other diseases are under investigation. This process is expected to be extended to fight diseases caused both by environmental factors and defective genes. Gene therapy also is being tested to induce the body's own cells to replace defective tissue or grow new, healthy organs or limbs. Doctors at New York Hospital-Cornell Medical Center reported that they injected a gene directly into a man's heart muscle to prompt the heart to grow its own bypass around an obstructed artery. Ultimately it is hoped that for some patients the therapy will replace coronary artery bypass surgery, one of the most common and expensive medical procedures. And for other patients, it may improve significantly the success of other procedures used to clear artery blockages that lead to heart attacks.
12. If patients in New Zealand are to benefit from the biotechnology revolution, the regulatory framework must guarantee both the importation of biotech-derived medicines, potentially including both cells, genes and tissues, and the ability of researchers in New Zealand within and beyond New Zealand's borders to contribute to the development of cures for diseases. The opportunities are many, many more than can be pursued, but for optimal development and availability to patients all countries with capabilities both public and private should be encouraged to work together in the interests of their own population and others.

B (j)(ii)

1. Biotechnology medicines, both their production and use, are regulated very tightly. In the USA, where most biologics have been developed, GM medicines are made in licensed facilities under Good Manufacturing Practice (GMP) with full oversight of the FDA. In addition, their use is by prescription under the guidance of a medical practitioner. They are fragile compounds and require carefully-controlled storage in order to maintain their efficacy. Their use in patients is controlled tightly and they are not released into the environment. Often injected, usually they are biodegraded rapidly which means that they pose no danger to the environment, even if they are released into it.
2. For instance, increasingly biotech vaccines are providing alternatives to the older attenuated strains of bacteria and viruses used in vaccines. Most biotech vaccines are made to represent an immunogenic fragment of the infectious agents (rather than from whole, live, viruses or bacteria), and do not go into the environment since they are injected and not taken orally. Such vaccines are very biogradable and require careful, controlled, storage prior to use. While effective and critical contributors to public health, the older vaccines can have safety profiles that are improved by the new technology, for example acellular pertussis largely that has replaced petussis.

B (j)(iii)

1. New Zealand stands to gain economically from health-related biotechnology in three clear ways: it could generate export income from health therapies, it could save untold millions on traditional disease treatments for which new and efficient GM-medicines are being developed, and it could boost its knowledge-based economy.
2. It is estimated that New Zealand discoveries of new health therapies could generate more than \$1 billion in export income in the next three years (The Sunday Star-Times (Auckland), July 16, 2000). Biotechnology, both in medicines and in agriculture, will allow New Zealand to compete in the global economy by playing to its comparative advantage as a biologically-based economy.
3. The economic benefits from GM technologies - in terms of public health cost savings in the treatment of debilitating illnesses - are considerable and hard to ignore. Considering Alzheimer's disease that affects about 7 per cent of people over 65 and 20% over 80 (Alzheimer's Society NZ website publication “Dementia”, 1999), it is the third-most-expensive illness to treat after heart disease and cancer - costs per patient range from close to US\$10,000 to close to US\$40,000 annually. The Alzheimer's Society predicts that the number of cases of Alzheimer's in New Zealand will more than double in the next 25 years (The Press (Christchurch), 29 July 2000). Stem cell technology is just one promising biotech-derived therapy currently in development to treat Alzheimer's. Once such a therapy becomes available, New Zealand's national healthcare system annually could save millions on Alzheimer's *alone*.
4. A modern, robust, economy is built on linkages in the areas of knowledge, learning, innovation, technology, public health, and the like. Such linkages are critical to growth in productivity, to growth in real wages, to export expansion, and to the creation and maintenance of competitive advantage. The pharmaceutical/biotech industry is a prime example of a knowledge-intensive industry. Its sophisticated R&D necessitates strong links to other components of the knowledge

economy including academic institutions, medical institutions, manufacturing facilities, and the like, directly and indirectly that boost economic growth.

B (j)(iv)

1. It has to be questioned on what basis one would consider denying patients in New Zealand access to the many new life-saving medicines derived from biotechnology. Straight economic reasons are insufficient when the new therapies are often more cost-effective than previous options and, in the case of vaccines, enable prevention of devastating infectious diseases. As problems with infectious diseases continue to challenge public health systems worldwide, vaccines often become the only hope. For instance, with AIDS a vaccine becomes the political panacea - an expectation yet to be fulfilled despite vast global research efforts. The AIDS therapies have relied on biotechnology, and using molecular biology to understand the nature of the virus and its pathogenicity are. This is particularly true for the Maori, to whom the Government of New Zealand has a special moral and historical obligation to protect.
2. A further ethical consideration is whether New Zealand can allow itself to accept the final products of biotechnology in the form of imported medicines, but refuse to allow biotech research to take place on New Zealand soil. Such a scenario would unfairly place the full burden of drug development on other countries - including any risks associated with biotech.
3. Does New Zealand wish to be an equal partner in the global community in the search for cures? Or does it wish merely to be the recipient of the fruits of other countries' labours?

Section B (l)

B (l) the international implications, in relation to both New Zealand’s binding international obligations and New Zealand’s foreign and trade policy, of any measures that New Zealand might take with regard to genetic modification, genetically modified organisms, and products, including the costs and risks associated with particular options

Section B (l) Summary

1. The current size of the New Zealand pharmaceutical market is NZ\$936 million (US\$471 million) (IMS Health Medras Database). US companies enjoy about a 29% share of this market. Should New Zealand change its regulatory framework in a way that would prohibit the import of medicines derived from biotechnology, it would likely harm its trade relations with partners such as the United States and Australia.

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Section B (m)

B (m) the range of strategic outcomes for the future application or avoidance of genetic modification, genetically modified organisms, and products in New Zealand

Section B (m) Summary

1. Biotechnology industries - with their emphasis on research and development, skills development, technological innovation, and activities that target the high value end of the market spectrum - are crucial to New Zealand's future economic and social well-being. To attract such industries to this country, and to maintain those already that exist, New Zealand requires a regulatory climate both that allows and supports, through realistic public and private funding, research in the field of genetic modification. One of the most critical strategic outcomes must be for ongoing research activities involving genetic modification technology to continue, permitting the creation and the use of GMOs. Such activities already are regulated and monitored adequately and there is no reason to constrain such research.
2. A second strategic outcome must be to ensure the continued availability of GM-derived therapeutic products many of which do not themselves contain GMOs and are incapable of replicating genetic material. The existing medicines legislation framework enables products like these to demonstrate their proven safety, efficacy and quality profiles. New Zealanders want access both to existing GM-derived medicines and to new medicines and therapies of the future.
3. For GMOs generally, the HSNO legislative regime provides a risk-benefit framework such that where, on a case-by-case basis, GMOs demonstrate that any risks appropriately can be managed, those GMOs can be approved. A further strategic outcome must be for the existing HSNO legislative framework and the ERMA approval process to continue, albeit with some important amendments and fine tuning.
4. The RMI’s view is that New Zealand should embrace all aspects of genetic modification and its technologies under a framework that ensures appropriate assessment and control, and that confers approval only on those products the benefits of which outweigh their risks.

B (m)

1. New Zealand's future as a productive, high-wage, knowledge-intensive and growing economy with high living standards - to which the population aspires - depends greatly on the extent to which the nation embraces concepts, and adopts strategies, that enable technological developments to occur. Furthermore, it depends on the ability of knowledge-intensive industries - such as pharmaceutical and biotechnology industries - to operate and flourish.
2. Research¹ has demonstrated that countries on a low-knowledge development path, specializing in technology industries with low rates of innovation, suffer from poor economic performance. Such countries also face reduced opportunities for improvements in other indicators of societal well-being, such as human and environmental health.

¹ Organisation for Economic Cooperation and Development (OECD) (1996a) “The Knowledge-Based Economy”. Excerpt from *1996 Science Technology and Industry Outlook*. Paris: OECD; OECD (1997a) *National Innovation Systems*. Paris: OECD; OECD (1998a) *Technology, Production and Job Creation: Best Policy Practices: Highlights*. Paris: OECD

3. Biotechnology industries - with their emphasis on research and development, skills development, technological innovation, and activities that target the high value end of the market spectrum - are crucial to New Zealand's future economic and social well-being. To attract such industries to this country, and to maintain those already that exist, New Zealand requires a regulatory climate both that allows and supports, through realistic public and private funding, research in the field of genetic modification.
4. Therefore, **one of the most critical strategic outcomes** must be for ongoing research activities involving genetic modification technology to continue, permitting the creation and the use of GMOs. This is the case particularly in the field of health-related biomedical research - one in which New Zealand health researchers already have proven expertise, demonstrating that this country has a competitive advantage in the research undertaken in our academic and medical research institutions.
5. Such activities are regulated and monitored adequately through the following existing arrangements:
 - Research (laboratory-based containment activities and field trials) involving GMOs, for example, is regulated under HSNO legislation and through the ERMA application processes,
 - The use of unapproved new GM-derived medicines in clinical trials is regulated under the medicines legislation, and
 - Future research into novel therapies - such as gene therapy to treat complex diseases resulting from gene malfunction - would, where they involve animal models, continue to be governed by animal welfare and ethics requirements, and, where appropriate, by ERMA requirements under the HSNO Act. Human gene therapy research would involve institutional ethics guidelines and Ministry of Health approval processes.
6. New Zealand's successes in biomedical research have meant that this country is contributing to global developments in biotechnology, rather than being merely the beneficiaries of the GM-derived medicines developed in other countries. To guarantee the integrity and future development of New Zealand's knowledge base, as well as the retention of scientific and medical personnel, New Zealand must continue to contribute to global GM research. To 'free-ride' - in other words, to become 'GM-free' - would be an inappropriate and irresponsible approach in an increasingly interdependent world.
7. A **second strategic outcome** must be to ensure the continued availability of GM therapeutic products. Although GM-derived, many such products do not themselves contain GMOs; many also are incapable of replicating genetic material. The existing regulatory framework enables products like these to demonstrate their proven safety, efficacy and quality profiles. The pharmaceutical industry in this country seeks to be involved in the delivery of products and therapies that improve health outcomes.
8. Patients who depend on GM medicines would not tolerate a ban on their availability. The pharmaceutical industry, the mission of which is to improve human health, also could not conceive of such a scenario (particularly for products in which no live GMOs persist). Given GM medicines' proven benefits, both to individuals and to the nation as a whole, a ban on such

medicines would cause a rapid decline in public health in this country. Moreover, major equity issues would arise should less fortunate members of society be forced to go without life-saving GM medicines while wealthier, more mobile, New Zealanders simply traveled to other countries to buy GM-derived medicines.

9. Conventional alternatives exist to some GM-derived medicines, as outlined in section B(b). However, many have proven to be less safe, more difficult to find, and more expensive to produce.
10. New Zealanders want access both to existing GM-derived medicines and to medicines and therapies of the future. The application of GM technologies to the discovery and development of advanced medicines to prevent, diagnose and treat diseases has enormous potential, particularly for diseases of significance in New Zealand - heart disease, cancer, asthma, diabetes, Hepatitis B and others. An appropriate regulatory framework - as is provided by the medicines legislation - ensures that such medicines continue to be available in this country.
11. For GMOs generally, the HSNO legislative regime provides a risk-benefit framework such that where, on a case-by-case basis, GMOs demonstrate that any risks appropriately can be managed, those GMOs can be approved. The benefit of the framework is its ability to work through a 'staged' process from laboratory-based containments, to field testing under controlled conditions, through to general release under well-defined circumstances.
12. While the HSNO/ERMA framework is appropriate for activities and products that have no other regulatory oversight, that is not the case for medicines. The RMI contends that medicines containing GMOs - such as vaccines that contain live GMOs - should not be subject both to the full requirements of the HSNO Act - with the need for a separate application to ERMA, *and* the medicines legislation over which the Ministry of Health has jurisdiction. Instead, such medicines only should be regulated under the Medicine Act.
13. The RMI's view is that New Zealand should embrace all aspects of genetic modification and its technologies under a framework that ensures appropriate assessment and control, and that confers approval only on those products the benefits of which outweigh their risks.
14. The avoidance of GM technology and GM products is not a viable option for New Zealand. It will deny the public access to existing life-saving medicines and future cures for genetic disorders. Furthermore, it will seal New Zealand's fate as a low tech, low-wage-, skills- and knowledge-, based economy with little likelihood of attracting the necessary investments to ensure long-term growth.

Section B (n)

B (n) whether the statutory and regulatory processes controlling genetic modification, genetically modified organisms, and products in New Zealand are adequate to address the strategic outcomes that, in your opinion, are desirable, and whether any legislative, regulatory, policy, or other changes are needed to enable New Zealand to achieve these outcomes

Section B (n) Summary

1. The RMI contends that the statutory and regulatory processes generally for controlling genetic modification, genetically modified organisms and products in the main are adequate to address the strategic outcomes identified in section B(m).
2. Essentially, the medicines regulatory framework under which all therapeutic products (GM-derived and GMO-containing) are assessed requires no change. On the other hand, while the HSNO/ERMA regime provides New Zealand with a sound framework for evaluating the human health, and environmental, impact of GMOs throughout a range of availability scenarios and levels of risk - laboratory containment, field testing and general release, the RMI contends that GMO-containing medicines do not belong within it in terms of being regulated via a second, separate, regime. Instead, GMO-containing medicines must be ‘uncoupled’ from the HSNO regime so that they are the subject only of one application - to the Ministry of Health Medsafe, and under its jurisdiction only.
3. For some time now the Ministry of Health has been planning new health care and therapeutic products legislation to replace the existing Medicines Act and Regulations. This would provide the opportunity for the principal legislation governing medicines to be strengthened so that requirements for GMO-containing medicines to satisfy environmental concerns are enshrined, without the need for a duplicative regime administered by a different regulator with the potential for conflicting requirements.

B (n)

1. The RMI contends that the statutory and regulatory processes generally for controlling genetic modification, genetically modified organisms and products in the main are adequate to address the strategic outcomes identified in section B(m). From the perspective of researched-based pharmaceutical companies in this country, medicines that companies seek to distribute and that are derived from genetic modification activities are evaluated thoroughly within a robust and internationally-agreed framework. It means that once consent is granted, the public can have confidence in the safety, efficacy and quality of such products from the time of initial consent continuing through their use in practice.
2. For GM-derived medicines, therefore, essentially the medicines regulatory framework requires no change.
3. On the other hand, while the HSNO legislation provides New Zealand with a sound framework for evaluating the human health, and environmental, impact of GMOs throughout a range of availability scenarios and levels of risk - laboratory containment, field testing and general release, the RMI contends that GMO-containing medicines do not belong within it in terms of being regulated via a second, separate, regime.
4. Accordingly, the RMI submits that the commission should recommend to government the uncoupling from the HSNO regime of GMO-containing medicines - so that applications for the importation of such medicines are not required to be made to ERMA. Instead, for reasons of consistency, efficiency, cost-effectiveness and compliance, all such medicines' applications must be lodged with, and be the responsibility of, only the one agency - Ministry of Health Medsafe.

5. The RMI is not seeking for GMO-containing medicines to escape scrutiny, rather for that scrutiny only to be undertaken once, and for one set of regulatory controls to apply and be administered by one agency.
6. ERMA has no expertise in the evaluation of medicines from a human health and safety perspective such that no medicine 'belongs' in the HSNO framework in this regard. Just as with finished dose form medicines that, as hazardous substances, now have been excluded from the HSNO Act where they cross any of the hazard thresholds - precisely because such medicines already are subject to a regulatory framework substantially that is similar, the same should occur for medicines that are GMOs.
7. While the pharmaceutical industry would expect environmental impact analysis of such medicines still to be undertaken, it should not necessitate a separate regime with a separate application to a second regulatory authority. Medsafe could contract ERMA to undertake the environmental evaluation - for which industry would be expected to pay, however, Medsafe must remain the primary regulatory decision-maker.
8. As the RMI understands it, this is what is being proposed in Australia following introduction of a new Gene Technology Bill 2000 designed to regulate the release, and monitoring, of GMOs. While the new agency that is to be established to undertake GMO regulatory and monitoring activities will have links with the Therapeutic Goods Administration (TGA) in regard to medicines that contain GMOs, TGA will remain the principal agency responsible for such medicines.
9. Australian legislators have seen the wisdom of avoiding duplication with, and conflicts in, regulatory requirements and for medicines has given pre-eminence to the medicines regulatory agency. New Zealand must do the same, especially now with a single joint trans-Tasman regulatory agency for therapeutic goods being proposed as a response to TTMRA. Without a similar co-ordinated approach to dealing with GMO-containing medicines, New Zealand is left with the HSNO framework as a second regulatory ‘hurdle’ with which GMO medicines must contend, adding a one-way trade barrier.
10. For some time now the Ministry of Health has been planning new health care and therapeutic products legislation to replace the existing Medicines Act and Regulations. This would provide the opportunity for the principal legislation governing medicines to be strengthened so that requirements for GMO-containing medicines to satisfy environmental concerns are enshrined, without the need for a duplicative regime administered by a different regulator with the potential for conflicting requirements.